

Changes in Open Access versus Subscription Journal Impact Factors

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Introduction

On June 20, 2009 Gunther Eysenbach the editor and publisher of the *Journal of Medical Internet Research (JMIR)* proudly announced on his blog that *JMIR* had become the leading medical informatics journal according to the impact factor rankings published by Thomson Reuters.ⁱ In the three years since it had first entered the rankings, *JMIR*'s impact factor had risen from 2.9 in 2006 to 3.0 in 2007, and to 3.6 in 2008 passing the official journal of the American Medical Informatics Association, which had been the leading journal in the field for decades.

This is the kind of story open access advocates love to hear. It confirms their belief that scholarly open access journals will inevitably rise to the top because being a click away from everyone on the Internet is better than being locked behind a guarded wall, regardless of how prestigious the walled off site is perceived to be. Ease of use, the argument goes, leads to use, which leads to recognition, which attracts better authors and raises the journal's impact and impact factor. As was the case with *JMIR* open access advocates argue openness is an evolutionary advantage and open access journals will in the end win out over their subscription-based peers.

The theory is good. The question is whether or not there is any data to ground the theory in reality. This paper is a preliminary investigation into this question. The data are somewhat limited and further analysis is clearly justified, but the preliminary indications are that open access journal impact factors do tend to increase relative to their subscription-based peers.

The data reviewed was drawn from the *Web of Knowledge Journal Citation Reports®*ⁱⁱ (the Thomson Reuters rankings referenced by Gunther Eysenbach) and from the SCImago Journal & Country Rank based on Elsevier's *Scopus®* database.ⁱⁱⁱ Using this data we will examine open access journals that were included in these databases in 2005 and continued to be included into 2008 and

look at the standing of these journals using the impact factor from the *Journal Citation Reports* and the SCImago Journal Rank (SJR) Indicator in *Scopus*®.

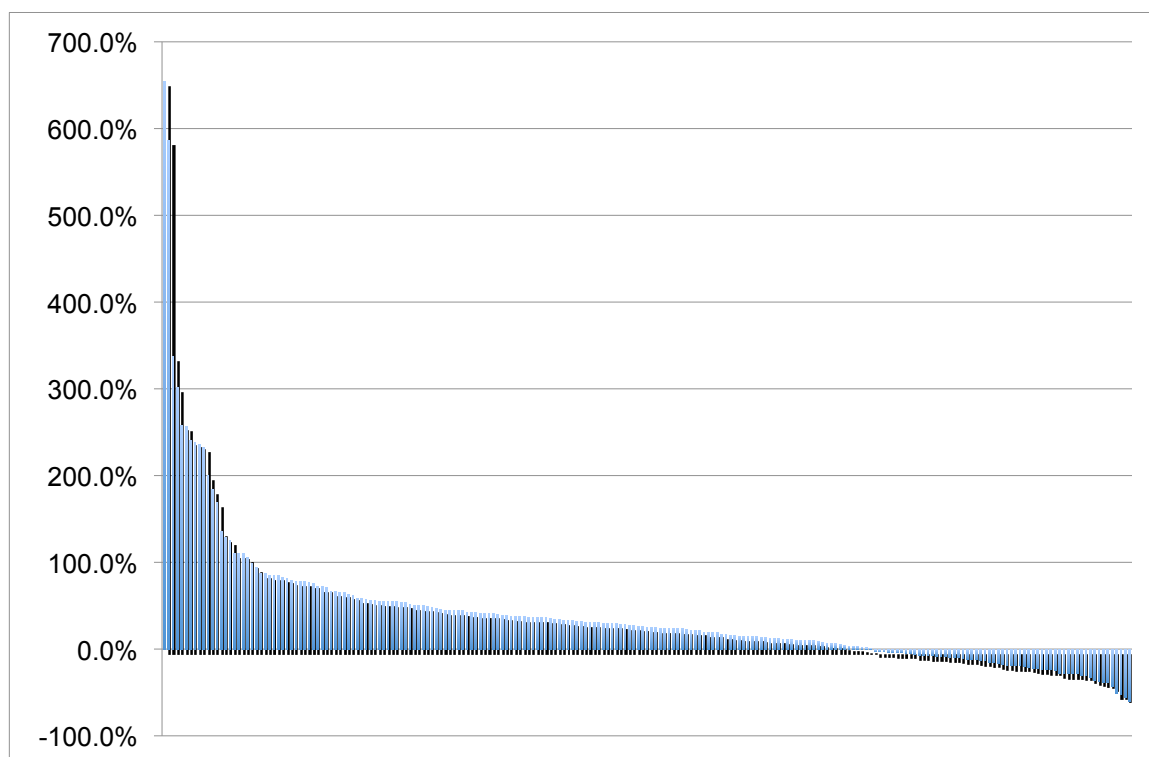
Indicator One: *Web of Knowledge Journal Citation Reports*®

In October 2004 Thomson published a study of open access journals.^{iv} The study found that 239, or about 1%, of the 20,000 titles covered by *Web of Knowledge* were open access. The large majority of the titles were in the fields of Medicine, Life Sciences and Physics, Engineering and Mathematics. Of these 239 titles 222, or 92.8% had impact factors in the *Journal Citation Reports* in both 2005 and 2008. The changes in impact factors from 2005 to 2008 were noticeable. Over 9% of the titles had over a 100% increase in impact factor and 17% more had increase of over 50%. If we assume that a change of plus or minus 10% is simply a random fluctuation, then 66.7% of the titles had increased impact factors during the period; 15.3% were unchanged, and only 18.0% showed a decline in impact factor of greater than 10%.

Interestingly, what is one of the best-known open access titles, *PLOS Biology*, had a 13.6% decline in impact factor. It did though remain the highest impact journal in Biology.

	Titles	%
Greater than 100% Increase	20	9.1%
50% to 99% Increase	38	17.1%
10% to 49% Increase	90	40.5%
0% to 10% Increase	14	6.3%
0% to 10% Decrease	20	9.0%
10% or Greater Decrease	40	18.0%
Total	222	100.0%

The distribution of percentage changes in impact factor for the 222 open access journals is shown below.



I do not have access to the full Journal Citation Reports data in a way that allows for a comparison of these open access titles with the subscription titles, however, it is unlikely that the distribution of subscription titles is comparable. It seems very unlikely that two-thirds of all of the titles in the *Web of Knowledge* database would have had an increase in their impact factors of greater than 10%.

Another way to look at this is the total impact — that is the sum of all of the titles' impact factors — of the open access journals. In 2005 this figure was 376.6 with only three titles having an impact factor greater than 10.0 and 44 more titles having an impact factor of greater than 2.0. In 2008 the total impact of the open access titles had increased by 19.4% to 449.7. Five titles had impact factors greater than 10.0 and 52 more greater than 2.0.

Indicator Two: SCImago Journal Rank Indicator

The SCImago database provided SCImago Journal Rank (SJR) data for journals. The universe for this part of the study was those titles that had SJR in both 2005 and 2008. These titles were matched against the titles in Marie E. McVeigh's Thomson study and against titles from the *Directory of Open Access Journals*.^v This provided a universe of 13,422 titles of which 825, or 6.1% were open access.

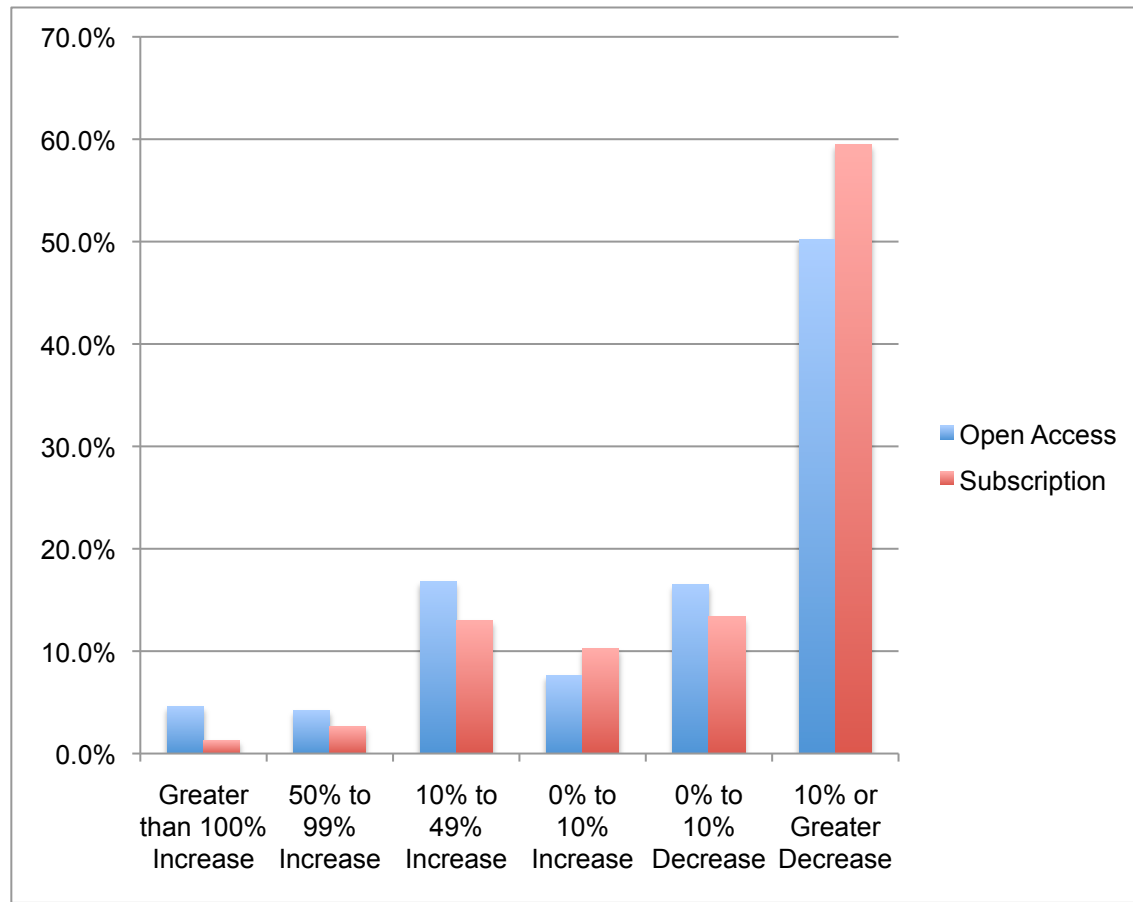
The SJR data is less dramatic, though differences between open access and subscription journals exist.

If we begin by looking at the distribution of the SJR ranks between open access and subscription titles there is surprisingly little difference in the distribution across the two. The 2008 SJR distributions are shown below.

	Open Access	Subscription	Open Access	Subscription
10.000 plus	1	5	0.12%	0.04%
1.000 to 9.999	6	191	0.73%	1.52%
0.999 to 0.500	24	343	2.91%	2.72%
0.499 to 0.250	60	773	7.27%	6.14%
0.249 to 0.100	157	1,856	19.03%	14.73%
0.099 to 0.050	154	2,351	18.67%	18.66%
less than 0.049	423	7,078	51.27%	56.19%
Total	825	12,597	100.00%	100.00%

The differences in the change of SJR between 2005 and 2008 are shown in the chart and the graph below.

	Open Access	Subscription	Open Access	Subscription
Greater than 100% Increase	38	164	4.6%	1.3%
50% to 99% Increase	35	333	4.2%	2.6%
10% to 49% Increase	139	1,636	16.8%	13.0%
0% to 10% Increase	63	1,293	7.6%	10.3%
0% to 10% Decrease	136	1,680	16.5%	13.3%
10% or Greater Decrease	414	7,491	50.2%	59.5%
Total	825	12,597	100.0%	100.0%



First, it is interesting to note the overall decline in SJR rankings from 2005 to 2008. The majority of both open access and subscription titles showed a decline in their SJR. There was also a decline in the total SJR. This may be an indication of a decline in the use of the journal literature generally. It is not difficult to speculate that the increased availability of high quality content on the web, but not in the formal journal literature, could account for this.

For open access titles 8.8% had SJR increase of 50% or more compared to only 3.9% of subscription journals. The difference is less in the 49% to 10% increase, but 16.8% open access journals were in this category versus 13.0% of subscription journals. About an equal percentage of open access and subscription titles were in the 10% plus or minus category and 50.2% of open access titles had a decrease in SJR of more than 10% versus 59.5% of subscription titles.

If we look at the total impact, that is the sum of the SJR of all titles, it is interesting that over the whole university of titles the total fell by 9.5% from 2,003.7 in 2005 to 1,814.0 in 2008. The total SJR of open access titles fell 1.9% from 111.1 in 2005 to 109.0 in 2008. The total SJR of subscription titles fell by

9.9% from 1,892.6 in 2005 to 1,705.1 in 2008. In 2005 open access titles made up 5.5% of the total SJR and in 2008 that percentage had risen to 6.0%.

Conclusion

This preliminary look at the change in the impact of open access versus subscription journals indicates that there is reason to believe that open access journals are increasing their impact relative to their subscription-based peers. It seems that openness does provide an evolutionary advantage. The data from the *Web of Knowledge Journal Citation Reports®* appears to point to a stronger advantage than the data from the SCImago database.

This, in combination with the increase in the proportion of the literature that is open access, is likely to mean that open access journals will become an increasingly important, and eventually the dominate, economic model for the scholarly journal.

Notes

ⁱ Gunther Eysenbach, "Open Access Journal JMIR rises to top of its discipline," June 20, 2009, *Gunther Eysenbach's Random Research Rants*, available at: <http://gunther-eyenbach.blogspot.com/2009/06/open-access-journal-jmir-rises-to-top.html> (accessed February 8, 2010).

ⁱⁱ Web of Science Journal Citation Reports® at: <http://admin-apps.isiknowledge.com/JCR> (accessed February 8, 2010 authentication required).

ⁱⁱⁱ The SCImago Journal & Country Rank at: <http://www.scimagojr.com> (accessed January 20, 2010).

^{iv} Marie E. McVeigh, "Open Access Journals in the ISI Citation Databases: Analysis of Impact Factors and Citation Patterns A citation study from Thomson Scientific," available at: <http://science.thomsonreuters.com/m/pdfs/openaccesscitations2.pdf> (accessed February 8, 2010).

^v *Directory of Open Access Journals*, Lund University Libraries, available at: <http://www.doaj.org/> (accessed January 20, 2010.)